

seldom discussed in public, have often been debated when two or three ornithologists are gathered together, are equally left without a word, while a word from Dr. Saxby would have been of the greatest value. Among such is that of the growth of the Puffin's monstrous bill. We have a very well told tale of the author's visit to a Puffin-warren on Hermaness, but it is just such an one as anybody not a naturalist would write, and contains nothing that dozens or scores of British ornithologists did not know before. Again, we may instance the migration of birds. An observer in such a look-out station as the extreme north of Shetland might, one would think, have furnished an infinite number of facts bearing on this important and perplexing question. Dr. Saxby contents himself with telling us when certain species come and go—very valuable information, no doubt, from so competent an authority; but as to the application of such facts, the impression they made as a whole upon his mind, their relation to similar observations in other places, not a word, so far as we can find, is said. Some of the Shetland migrants, we happen from other sources to know, touch the islands as their extreme western, others as their extreme eastern, limit; but this is all one to our author, who does not seem to care whence the wanderers come or whither they go; they are regarded by him as "the wind that bloweth where it listeth."

But enough of this unpleasing task. With the most sincere regret for Dr. Saxby's misfortunes and untimely fate, and a heartfelt sympathy with those who have to mourn his loss, we are compelled to say so much. The old adage *de mortuis* is very well in its way, but when we have him termed by reviewers "one of the first of our ornithologists," his book "a most valuable contribution to the ornithology of Great Britain," and all the rest of it, we must, if we speak at all, speak the truth. We could count at least a score of British ornithologists who, had their lot been cast in the Shetland Islands, would probably have done much better, and would certainly not have been contented to do so little. His intellectual and scientific capacity is reflected in his editor, who sees in the conductor of a popular magazine one "who has for so many years sat at the focal point" of ornithology—a metaphorical expression to which many meanings might be attached, one of which (though obviously not that of the writer) is that a focus may be found on a blank surface which receives rays of light and does not return them. The "Birds of Shetland" is a book of fair mediocrity. The next faunist, whose work we may be called on to review, will, we hope, take warning by its deficiencies, though for truthful observation—strictly limited, we must say, to observation—he cannot have a better model than Dr. Saxby. More, however, is expected of a faunist in these days.

MARSH'S "MAN AND NATURE"

The Earth as Modified by Human Action. A new edition of "Man and Nature." By George P. Marsh. (Sampson Low and Co., 1874)

AMONG the varied forms of energy by which the ceaseless changes of the earth's surface are produced—subterranean heat, air, rain, frosts, rivers, glaciers, the sea, and the rest—the geologist requires to include as a

not unimportant agent, Life, both vegetable and animal. Some of the ways in which plants act in augmenting or retarding the operation of the inorganic forces are familiar enough. How often, for instance, do we see the walls of a ruin which have been split or cast down by the growing roots of some sapling tree which has found a footing in their masonry. The frosts and storms of winter would have levelled the walls in the end, but their action has been anticipated by the tree. Again, as an everyday example of the opposite kind of action, we may take the way in which the matted roots of trees which grow along the alluvial margin of a river serve to bind the loose sands or clays of the bank together, and retard the wasting effects of the current. Animals, too, have their own ways of effecting similar results, as every observant Rambler in the country can testify. Moles, rabbits, and other burrowing animals lay bare the soil to rain and rivulet, and where they carry on their operations in loose materials liable to be dispersed by wind, as for instance on the sand-dunes by the sea, they may lead to the destruction of much valuable land under the drifting sand which they have uncovered. If we travel into other parts of the globe we find other and better examples, as in the dams of the beaver and the reefs of the coral-polyps. Less easily definable, but probably far more important, are the influences of life upon climate; for although the distribution of the fauna and flora of any region is in great measure regulated by climate, it is no less true that climate is modified by the flora, as is shown by the desiccation of countries which, once green and fertile, have been stripped of their woods.

So long as man remained in the savage state his influence resembled, and in some respects fell short of, that of the terrestrial animals who were his contemporaries. He felled a tree here and there, and when he had learned the use of grain, turned moorland into rude fields for culture. But his warfare lay not with the inanimate surface, but mainly with the beasts, fowls, and fish on which he chiefly depended for food and clothing. With the slow development of civilisation his influence as a geological agent has steadily increased, until now it must be ranked in the first class of the forces by which the surface of the land is modified. The time is yet too short during which accurate registers have been kept to admit of any very precise determination of the amount, sometimes even of the nature, of the changes effected by human action. But enough has been recorded to justify the attempt to indicate at least the general tendency of man's operations, while at the same time tolerably definite information exists regarding the results of some of his interferences with the ordinary economy of nature. In some respects man's influence is antagonistic to nature's usual modes of working, but of course, viewed broadly, it cannot do more than alter the balance of forces, giving to some a greater and to others a less share of work than in a natural state would be accomplished by them.

Mr. Marsh's "Man and Nature," published eleven years ago, was the first attempt, at least in English, to take a general view of this subject from a wide basis of reading. A work of research and generalisation from the labours of others rather than of original observation, it called attention to a field of inquiry too little cultivated by geologists. In fact, to its influence we may with pro-

ability ascribe the greater prominence now given in treatises of Physical Geography and Geology to the geological aspects of man's position on the globe. A new edition shows that the efforts of the author have not been wholly unappreciated here by that general reading public, not of professed *savans*, but of educated, observing men, to whom they were addressed. He must be gratified also to find that as his materials were in large measure derived from the observations of foreign writers, his work has met with a special measure of notice and approval on the Continent. It is frequently cited by recent French and German authors in Physical Geography and Geology, and a special Italian edition of it has lately been published under the author's supervision.

Of a book which has now established its position it is not necessary to say anything by way of criticism. This new edition has been somewhat enlarged, but the same division of subjects is retained. The author, who, besides being familiar with the characteristics of large tracts of his own country, the United States, has travelled extensively in Europe, brings his work abreast of the most recent discoveries and conjectures. The extent of his reading, remarkable enough in the first edition, is evinced again in this new issue. He seems to have come across the most out-of-the-way blue-book of the most out-of-the-way kingdom, and it has yielded to him some apposite illustration or suggestive fact. And even though we may be disposed to admire more the wonderful industry of research than the judgment in the selection of evidence, we cannot read even the most doubtful bits of testimony cited and commented upon without being made to think about what we may perhaps have noticed ourselves but never really reflected upon before. And there could hardly be a greater merit in a book than this. As to the change of title in this new edition, we are inclined to think it a mistake, for two reasons. In the first place, it is not in itself so good a title as the first; and in the second, the changes in the present edition are not sufficient to warrant the dropping of the name by which the book is generally known. This, however, is a small matter, and will not, we hope, damage the progress of a treatise which certainly ought to be one of the standard works of reference in the library of every well-educated Englishman.

BRINKLEY'S ASTRONOMY

Brinkley's Astronomy. Revised and partly re-written, with additional chapters, by John William Stubbs, D.D., Fellow and Tutor of Trinity College, and Francis Brünnow, Ph.D., late Astronomer Royal of Ireland, and Professor of Astronomy in the University of Dublin. (London: Longmans and Co., 1874.)

DR. BRINKLEY'S treatise on elementary astronomy, of which this is a new and revised edition, has been for many years one of the recognised text-books provided for the use of Trinity College, Dublin. We believe, however, that it is a work comparatively little known out of Ireland, and probably many English astronomers were not aware of its existence till its reappearance, in a new dress, under the able guidance and direction of Dr. Stubbs and Dr. Brünnow, by whom the present edition is revised, enlarged, and partly re-written. Its popularity as

a text-book will doubtless be no longer confined to the sister island; for this treatise, although elementary in its character, contains such clear and concise explanations of some of the principal problems in astronomy, that its intrinsic merit alone will probably find for it a place among the choice volumes of every astronomical student, and also on the shelves of every astronomical library. We do not say that this "Astronomy" is all that can be desired, nor will it obviate the necessity for the employment of a more elaborate work on practical astronomy where extreme accuracy is required in the reduction of observations; but it does on the whole explain the different problems in a clear and easy manner and in popular language, without sacrificing those details which are necessary for a proper elucidation of the different problems. We should, however, have been glad if a more detailed account had been given of some of the subjects treated upon, especially in the chapter describing the instruments usually employed in making astronomical observations. The methods of determining the instrumental adjustments are sufficiently explained, but it would be of great service to amateur astronomers if examples had been given of the complete reduction of both meridional and equatorial observations, a kind of information rarely to be found in detail in astronomical treatises.

The name of Dr. Brinkley involuntarily carries us back so far into the history of modern astronomy that a doubt existed in our mind, before opening the book, that an astronomical treatise originally prepared so many years ago, even by so distinguished an astronomer, must necessarily retain much of an antiquated character, either in arrangement or material. Thanks, however, to the great practical knowledge of Dr. Brinkley, and to the editorial labours of Dr. Stubbs and Dr. Brünnow, we find the science is represented as accurately as if the work had been published now for the first time. In the days of Dr. Brinkley, directors of observatories did not consider it their duty to reduce their observations with that completeness which we are now accustomed to see. It was not till the present Astronomer Royal, Sir George Airy, was appointed to the direction of the Royal Observatory that the numerous observations of the moon and planets made at Greenwich since 1750 were reduced upon one uniform system, and of sufficient accuracy to be made available for the correction of the elements of the lunar and planetary orbits. Under these circumstances, many of the principal astronomical constants were not sufficiently determined in the early part of the present century, especially of those relating to observing astronomy, to admit of the production of a practical handbook in so satisfactory a manner as at the present day; but in all that was essential for the proper comprehension of the general planetary and lunar motions, no one had greater qualifications for such a task than the learned Bishop of Cloyne, who had himself, in addition to other researches on refraction and parallax, investigated the value of the constant of aberration from observations made with the 8-ft. circle at the observatory of Trinity College.

This introductory treatise is founded on a series of annual lectures on astronomy delivered by Dr. Brinkley before the undergraduates of Trinity College during his occupation of the Andrews Chair of Astronomy in the University of Dublin. At the request of the College